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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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04/21/2005

Takashi Ochi

IPE-056

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EXAMINER

SYKES, ALTREV C

ART UNIT

PAPER NUMBER

1786

MAIL DATE

DELIVERY MODE

06/17/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/532,082	<b>Applicant(s)</b> OCHI ET AL.	
	<b>Examiner</b> ALTREV C. SYKES	<b>Art Unit</b> 1786	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 April 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,4,7,8,10-12,14-21,23,24,27-34,39-41,46,47,53,56,57 and 59 is/are pending in the application.
- 4a) Of the above claim(s) 14,15,20,21,23,24,27-34,39-41,46 and 47 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4,7,8,10-12,16-19,53,56,57 and 59 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Examiner notes that the rejection mailed on December 9, 2009 was intended to be a non-final rejection as affirmed by the absence of the final rejection paragraph in the conclusion section therein. As such, the marking of box 2a on the PTOL-326 form of that office action was done so in error.
2. In view of the submitted English translations of the foreign priority documents, examiner is persuaded that Li et al. *Electrospinning of Polymeric and Ceramic Nanofibers as Uniaxially Aligned Arrays* no longer qualifies as prior art. Those rejections have been withdrawn.
3. Applicant's arguments, see pg. 4, filed April 9, 2010, with respect to the rejection(s) of claim(s) 1, 10 and 53 under 35 U.S.C. 102(b) as being anticipated by Deitzel et al. *Controlled deposition of electrospun poly(ethylene oxide) fibers* have been fully considered and are persuasive. While Deitzel teaches an aggregate of nanofibers made of a thermoplastic polymer, the reference does not explicitly teach fibers having the small spread of single fiber fineness as claimed by applicant. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of a different interpretation of Deitzel.
4. Applicant's arguments, see pg. 4, filed April 9, 2010, with respect to the rejection(s) of claim(s) 1, 10 and 53 under 35 U.S.C. 102(b) as being anticipated by Theron et al.

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*Electrostatic field-assisted alignment of electrospun nanofibres* have been fully considered and are persuasive. While Theron teaches an aggregate of nanofibers made of a thermoplastic polymer, the reference does not explicitly teach fibers having the small spread of single fiber fineness as claimed by applicant. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of a different interpretation of Theron.

5. Finally, applicant argues each of the cited references discloses an electrospinning method. As described on page 2, line 25, to page 3, line 13, of the present specification (paragraph [0009] of the publication, US 2006/0057350, of the present application), the prior art, e.g., Polymer, Vol. 40, 4585 (1999), and (Polymer, Vol. 43, 4403 (2002), teaches that an electrospinning method may produce yarns having small single fiber fineness but the yarns have a large spread of single fiber fineness. Therefore, the prior art supports a conclusion that the methods of Dietzel and Theron do not produce an aggregate of nanofibers having a small fiber fineness by number average and a small spread of single fiber fineness as required by the claims of the present application.

Examiner is not fully persuaded. Examiner notes that while prior art publication Polymer, Vol 43, 4403 (2002) teaches a spread of single fiber fineness, the reference *also* teaches how to modify the parameters of the electrospinning process in order to arrive at the claimed range of single fiber fineness as claimed by applicant. Specifically, examiner notes that applicant discloses that beading should be avoided. (See [0009]) instant

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application) Prior art publication Polymer, Vol 43, 4403 (2002) addresses this issue. (See pg. 4411 Conclusions and all) Finally, prior art publication Polymer, Vol. 40, 4585 (1999) teaches polymer fibers having diameters *in the range of 100nm* and teaches how to modify the parameters of the electrospinning process in order to arrive at the claimed range of single fiber fineness as claimed by applicant. (See Introduction and all) Therefore, examiner notes that the prior art teaches the overall argued novelty of the claimed invention as set forth further below.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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8. Claims 1, 4, 12, 17, 19, 53 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fong et al. *Beaded nanofibers formed during electrospinning* in view of Deitzel et al. *Controlled deposition of electrospun poly(ethylene oxide) fibers*.

Regarding claims 1, 19 and 53, Fong et al. discloses polymer fibers produced from polymer solutions, with diameters in the range of 100 nm. (See Abstract) According to the instant specification single fibers in a range from  $1 \times 10^{-7}$  to  $2 \times 10^{-4}$  dtex in single fiber fineness are equivalent to single fiber diameter from 1 to 150 nm. (See [0122]) Also, according to the instant specification single fibers in a range from  $1 \times 10^{-7}$  to  $1 \times 10^{-4}$  dtex in single fiber fineness are equivalent to single fiber diameter from 1 to 100 nm. (See [0124]) While Fong et al. appears to be directed to producing beaded nanofibers, examiner notes that the reference is also explicit as to the steps required to produce non-beaded fibers. (See pg. 4585, 3<sup>rd</sup> paragraph) It has been well settled that a reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). As such, examiner notes that the nanofibers of Fong et al. would be expected to have a small fiber fineness by number average and a small spread of single fiber fineness since the reference is explicit to polymer nanofibers in the range of 100 nm having no beading. (See Figure 2f and table 2) Fong et al. does not specifically disclose an orientation that extends in one dimension over a definite length or a fibrous material.

Deitzel et al. discloses the deposition of sub-micron polymer fibers (<300 nm in diameter) on a substrate through the use of an electrostatic lens element and collection target of opposite polarity. (See Abstract) Deitzel et al. discloses electrospinning has

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been known to be used for electrospun textiles for protective clothing and filtration applications. (See Col 1, second paragraph) Deitzel et al. discloses the objective is to construct an electrospinning apparatus that uses electrostatic fields, to dampen the bending instability inherent in the electrospinning process. (See Col 4, first paragraph) Deitzel et al. discloses yarns of electrospun fibers used in WAXD experiments were collected using a combing technique. (See Col 7, second paragraph) Therefore, examiner notes that utilizing a combing technique would align the fibers in one dimension over a definite length. Deitzel et al. discloses by dampening the chaotic motion of the jet, it becomes possible to deposit electrospun fibers on a substrate in a more targeted fashion. When the target is a rotating drum covered with copper foil and charged, the electrospun fibers are collected in a strip. (See Col 12, first full paragraph) Deitzel et al. also discloses it is possible to collect the electrospun fibers in the form of a yarn with the multiple field apparatus. (See Col 13, first full paragraph) Deitzel et al. discloses a fiber mat is obtained. (See Fig. 7b and Col 11, second sentence)

As Fong et al. and Deitzel et al. are both directed to polymer nanofibers having no beading, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the combing technique as taught by Deitzel et al. for collecting the fibers as disclosed by Fong et al. motivated by the desire to utilize the obtained fibers in a fibrous structure. (See Deitzel Fig. 7b and Col 11, second sentence and Col 1, second paragraph)



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Regarding claim 4, Fong et al. discloses beads and beaded fibers are less likely to be formed for the more viscous solutions. (See pg. 4588, 1<sup>st</sup> paragraph) Fong et al. demonstrates this theory further with the measurements in Table 2 wherein the increased viscosity favors the formation of smooth fibers with a diameter in range of less than 80nm. (See also pg. 4589, 1<sup>st</sup> full paragraph) Therefore, it would have been well within the ordinary skill of one in the art at the time of the invention to optimize the width of the aggregate to that as claimed by applicant in view of the teachings of Fong directed to providing smooth fibers. Further, it is seen that the higher the net charge density, the more likely that a smooth fibers will be formed also having a diameter of less than 80 nm. (See Fig. 2f, Table 2)

Regarding claims 12 and 17, Deitzel et al. discloses fiber mats and yarns are analyzed after the completed electrospinning process. (See Abstract) Therefore, it would have been obvious to one of ordinary skill in the art to utilize the aggregate of nanofibers as taught by Deitzel et al. in a fibrous material as claimed by applicant.

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Regarding claim 59, Deitzel et al. does not specifically disclose that the orientation of the nanofibers extend in one dimension for at least several meters. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the orientation in one dimension to be at least several meters motivated by intended use since Deitzel et al. discloses that the nanofibers are known to be used in various end products. (See Col 1, second paragraph)

9. Claims 7, 8, 11, 12, 16-19, 56, 57 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fong et al. *Beaded nanofibers formed during electrospinning* in view of Deitzel et al. *Controlled deposition of electrospun poly(ethylene oxide) fibers* and further in view of Gogins et al. (US 2004/0116025).

Regarding claims 7 and 57, Fong et al. does not specifically disclose the polymers as claimed by applicant.

Gogins teaches polymeric compositions such as polyolefin, polyamide, and polyester are known to be adequate for electrospinning. (See [0038]).

As Fong et al. and Gogins et al. are both directed to fine polymer fibers, the art is analogous. Therefore, it has been well settled that a prima facie case of obviousness exists for one of ordinary skill in the art to substitute one material for another outside the showing of unexpected results when both are taught in the prior art to be useful for the

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same purpose. In this case, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use other polymers as taught by Gogins as the thermoplastic material used to create a nanofiber aggregate as disclosed by Fong.

Regarding claims 8, 10, and 12 Fong et al. is not explicit to the strength of the aggregate.

However, Gogins et al. discloses fine fibers produced by electrostatic spinning, melt spinning, melt blowing, or splittable "islands in a sea" methods. (See [0031] and [0040])

Gogins et al. discloses nanofibers can be arranged in structures such as fabrics for protective suits or clothing or other barriers against hazardous materials. (See [0008], [0011] and [0030]) As such, it would have been obvious to one of ordinary skill in the art to optimize the strength of the aggregate of nanofibers motivated by end product use such as for a fabric. Further, examiner notes that the strength of the nanofibers and the rate of elongation of absorbing water would depend greatly on the type of thermoplastic utilized as well as the fiber production method.

Regarding claims 11 and 16, modified Fong et al. does not disclose a functional chemical agent.

Gogins et al. discloses the fine fiber can be made of a polymer material or a polymer plus additive. (See [0052]) Gogins et al. discloses the resistance to the effects of heat, humidity, impact, mechanical stress and other negative environmental effect can be substantially improved by the presence of additive materials. (See [0054])

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize an additive material (i.e. functional chemical agent) in the polymer materials used in the electrospinning process of modified Fong et al. motivated by the desire to tailor the fabric with respect to resistance to the effects of heat, humidity, impact, and mechanical stress. (See [0054])

Regarding claims 17-19, 56 and 59 Gogins et al. discloses polymeric compositions with improved properties that can be used in a variety of applications including the formation of nanofibers, fiber webs, fibrous mats, etc. (See [0040]) Gogins et al. discloses a fabric can be used as protective suits or clothing or other barrier uses such as containers of hazardous materials. (See [0008] and [0030]) Gogins et al. discloses nanofibers can be arranged in structures that are very efficient barriers to aerosol particles, but still allow excellent air permeability. (See [0011]) As such, examiner notes that one of ordinary skill in the art at the time of the invention would have been easily motivated to modify the mass per unit area of the fiber in the fibrous material based on the intended end use of the fibrous material since one would appreciate that an undergarment and a protective suit would need to meet different requirements for weight and air permeability. Gogins et al. discloses the multilayer fabric typically includes an outer shell, either a woven or non-woven material that can act to protect the fine fiber (nanofiber) layer from damage, contamination or wear. Often the outer shell is combined with the fine fiber layer using a variety of manufacturing techniques; however, such a combination is preferably

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manufactured using either direct application or adhesive lamination technology. It may of course be worn in many configurations with other garments, including as an undergarment. (See [0032] and [0055]) As such, it would have been obvious to one of ordinary skill in the art to orient the nanofibers to provide selected barrier properties.

Fong et al. teaches the fiber length is also affected by the spinning conditions. (See Table 2)

10. Claims 1, 4 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Theron et al. *Electrostatic field-assisted alignment of electrospun nanofibres* in view of Fong et al. *Beaded nanofibers formed during electrospinning*.

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Regarding claim 1 Thereon et al. discloses electrostatic field-assisted assembly techniques combined with an electrospinning process used to position and align individual nanofibres (NFs) on a tapered and grounded wheel-like bobbin. The bobbin is able to wind a continuously as-spun nanofibre at its tip-like edge. The alignment approach has resulted in polyethylene oxide-based NFs with diameters ranging from 100–300 nm and lengths of up to hundreds of microns. The results demonstrate the effectiveness of this new approach for assembling NFs in parallel arrays while being able to control the average separation between the fibres. (See Abstract) Therefore, examiner notes that the fibers would be aligned in one dimension over a definite length. (See Introduction, first paragraph) Theron is not explicit to fibers having a small spread of single fiber fineness as claimed by applicant.

Fong et al. discloses polymer fibers produced from polymer solutions, with diameters in the range of 100 nm. (See Abstract) According to the instant specification single fibers in a range from  $1 \times 10^{-7}$  to  $2 \times 10^{-4}$  dtex in single fiber fineness are equivalent to single fiber diameter from 1 to 150 nm. (See [0122]) Also, according to the instant specification single fibers in a range from  $1 \times 10^{-7}$  to  $1 \times 10^{-4}$  dtex in single fiber fineness are equivalent to single fiber diameter from 1 to 100 nm. (See [0124]) While Fong et al. appears to be directed to producing beaded nanofibers, examiner notes that the reference is also explicit as to the steps required to produce non-beaded fibers. (See pg. 4585, 3<sup>rd</sup> paragraph) Fong et al. discloses higher viscosity favors formation of fibers without beads, higher net charge density not only favors formation of fibers without beads, but also favors the

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formation of thinner fibers. Finally reduced surface tension favors the formation of fibers without beads. (See pg. 4585, 3<sup>rd</sup> paragraph) It has been well settled that a reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art, including nonpreferred embodiments. *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). As such, examiner notes that the nanofibers of Fong et al. would be expected to have a small fiber fineness by number average and a small spread of single fiber fineness since the reference is explicit to polymer nanofibers in the range of 100 nm having no beading. (See Figure 2f and table 2)

As Theron et al. and Fong et al. are both directed to electrospun nanofibers, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art to provide a small spread of single fiber fineness as taught by Fong et al. for the array of nanofibers as disclosed by Theron et al. motivated by expected success since Theron teaches nanofibers having diameters which correspond to the single fiber fineness by number average. As such, examiner notes that at the time of the instant invention, one of ordinary skill in the art would have known how to make polymeric nanofibers as well as how to produce beaded and unbeaded structures as needed in view of the prior art teachings.

Regarding claim 4, Fong et al. discloses beads and beaded fibers are less likely to be formed for the more viscous solutions. (See pg. 4588, 1<sup>st</sup> paragraph) Fong et al.

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demonstrates this theory further with the measurements in Table 2 wherein the increased viscosity favors the formation of smooth fibers with a diameter in range of less than 80nm. (See also pg. 4589, 1<sup>st</sup> full paragraph) Therefore, it would have been well within the ordinary skill of one in the art at the time of the invention to optimize the width of the aggregate to that as claimed by applicant in view of the teachings of Fong directed to providing smooth fibers. Further, it is seen that the higher the net charge density, the more likely that a smooth fibers will be formed also having a diameter of less than 80 nm. (See Fig. 2f, Table 2)

Regarding claim 10, one of ordinary skill in the art would expect for the aligned polymer nanofibers of Thereon et al. would have a rate of elongation at absorbing water as claimed by applicant since the structure of the aligned nanofibers have been shown to be substantially similar to that of the aggregate claimed by applicant.

11. Claims 12 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Theron et al. *Electrostatic field-assisted alignment of electrospun nanofibres* in view of Fong et al. *Beaded nanofibers formed during electrospinning* and further in view of Deitzel et al. *Controlled deposition of electrospun poly(ethylene oxide) fibers*.



Regarding claim 12, modified Theron et al. is not explicit to the use of the nanofibers in a fibrous material.

Deitzel et al. discloses fiber mats and yarns are analyzed after the completed electrospinning process. (See Abstract) Deitzel et al. discloses electrospinning has been known to be used for electrospun textiles for protective clothing and filtration applications. Other applications that are being explored include scaffolding for tissue growth, and optical and electronic applications. (See Col 1, second paragraph)

As Theron and Deitzel et al. are both directed to modified electrospinning processes to produce polymer nanofibers, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art to utilize the aggregate of nanofibers as taught by Theron et al. in a fibrous material as claimed by applicant. Additionally, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the electrospinning process of modified Theron to produce aligned nanofibers which could be used in at least the same capacity as that of the polymer nanofibers already known in the art as taught by Deitzel.

Regarding claim 59, Theron et al. does not specifically disclose that the orientation of the nanofibers extend in one dimension for at least several meters. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the

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orientation in one dimension to be at least several meters of Theron motivated by intended use since Deitzel et al. discloses that the nanofibers are known to be used in various end products. (See Col 1, second paragraph)

12. Claims 7, 8, 10-12, 16-19, 56, 57 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Theron et al. *Electrostatic field-assisted alignment of electrospun nanofibres* in view of Fong et al. *Beaded nanofibers formed during electrospinning and further* in view of Deitzel et al. *Controlled deposition of electrospun poly(ethylene oxide) fibers* and Gogins et al. (US 2004/0116025).

Regarding claims 7 and 57, modified Theron et al. is not explicit to the thermoplastic polymers as claimed.

Gogins teaches polymeric compositions such as polyolefin, polyamide, and polyester are known to be adequate for electrospinning. (See [0038]).

As modified Theron et al. and Gogins et al. are both directed to fine polymer fibers, the art is analogous. Therefore, it has been well settled that a prima facie case of obviousness exists for one of ordinary skill in the art to substitute one material for another outside the showing of unexpected results when both are taught in the prior art to be useful for the same purpose. In this case, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use other polymers as taught by Gogins as the

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thermoplastic material used to create a nanofiber aggregate as disclosed by modified Theron.

Regarding claims 8, 10, and 12 modified Theron et al. is not explicit to the strength of the aggregate. However, Gogins et al. discloses fine fibers produced by electrostatic spinning, melt spinning, melt blowing, or splittable "islands in a sea" methods. (See [0031] and [0040]) Gogins et al. discloses nanofibers can be arranged in structures such as fabrics for protective suits or clothing or other barriers against hazardous materials. (See [0008], [0011] and [0030]) As such, it would have been obvious to one of ordinary skill in the art to optimize the strength of the aggregate of nanofibers motivated by end product use such as for a fabric. Further, examiner notes that the strength of the nanofibers and the rate of elongation of absorbing water would depend greatly on the type of thermoplastic utilized as well as the fiber production method.

Regarding claims 11 and 16, modified Theron et al. does not disclose a functional chemical agent.

Gogins et al. discloses the fine fiber can be made of a polymer material or a polymer plus additive. (See [0052]) Gogins et al. discloses the resistance to the effects of heat, humidity, impact, mechanical stress and other negative environmental effect can be substantially improved by the presence of additive materials. (See [0054])

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize an additive material (i.e. functional chemical agent) in the polymer materials used in the electrospinning process of modified Theron et al. motivated by the desire to tailor the fabric with respect to resistance to the effects of heat, humidity, impact, and mechanical stress. (See [0054])

Regarding claims 17-19, 56 and 59 Gogins et al. discloses polymeric compositions with improved properties that can be used in a variety of applications including the formation of nanofibers, fiber webs, fibrous mats, etc. (See [0040]) Gogins et al. discloses a fabric can be used as protective suits or clothing or other barrier uses such as containers of hazardous materials. (See [0008] and [0030]) Gogins et al. discloses nanofibers can be arranged in structures that are very efficient barriers to aerosol particles, but still allow excellent air permeability. (See [0011]) As such, examiner notes that one of ordinary skill in the art at the time of the invention would have been easily motivated to modify the mass per unit area of the fiber in the fibrous material based on the intended end use of the fibrous material since one would appreciate that an undergarment and a protective suit would need to meet different requirements for weight and air permeability. Gogins et al. discloses the multilayer fabric typically includes an outer shell, either a woven or non-woven material that can act to protect the fine fiber (nanofiber) layer from damage, contamination or wear. Often the outer shell is combined with the fine fiber layer using a variety of manufacturing techniques; however, such a combination is preferably manufactured using either direct application or adhesive lamination technology. It may of

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course be worn in many configurations with other garments, including as an undergarment. (See [0032] and [0055]) As such, it would have been obvious to one of ordinary skill in the art to orient the nanofibers to provide selected barrier properties.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

### ***Conclusion***

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALTREV C. SYKES whose telephone number is (571)270-3162. The examiner can normally be reached on Monday-Thursday, 8AM-5PM EST, alt Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ACS/  
Examiner  
6/11/10

/Ula C Ruddock/  
Primary Examiner, Art Unit 1786